

VI.—*Hints for the Preservation of Objects of Natural History.* By
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Preparations of natural history have two great enemies: insects and damp. The latter requires great and constant attention to prevent: the former are combatted by what are called preservatives. The preservatives in common use are preparations of Corrosive Sublimate and Arsenic.

Of the former, a very good preparation is made by merely dissolving a certain proportion in spirits of wine. For common purposes, such as the preservation of the soles of the feet, or inside of the mouth of animals, a scruple of corrosive sublimate may be dissolved in one ounce of the spirit; but for the finer operations, where the colours of insects and feathers, &c. are concerned, two grains of corrosive sublimate to an ounce of spirit, will be strong enough: made of this strength, the solution dries without leaving a white crust of crystals on the specimen; while it will prevent the attacks of insects, and even mouldiness, if ordinary care be taken to keep the specimens dry.

Another preparation of corrosive sublimate and arsenic, together, is recommended for the preservation of insects. Its composition is as follows:

Take of arsenic in powder, one ounce.

Corrosive sublimate, one ounce.

Spirit of wine, three ounces.

Spirit Sal Ammoniac, or Spirit Ammonia, one ounce. Mix them well together, and keep them in a bottle, labelled "POISON," for use.

But of all the preparations used for the preservation of the skins of animals, the arsenical soap, invented by BECŒUR of Mentz, is the most celebrated and most useful. It is made thus:

Take of Arsenic in powder, 2 lbs. White soap, 2 lbs. Salts of Tartar, 12 oz. Lime in powder, 4 oz. Camphor, 5 oz.

Cut the soap into thin slices, and melt it in a little water or spirit of wine over the fire; then add the salts of Tartar and the lime. Take the mixture off the fire, and add the arsenic, taking care to mix it well by trituration in a mortar, or other convenient vessel; and when nearly cold, mix in the camphor, previously reduced to powder by the help of spirit of wine. When thus made, keep the arsenical soap in a glazed earthen pot, or a wide-mouthed bottle, and when used, dilute it with water to the consistence of cream.

The principal materials for both the above preparations may be procured in every bazar in India.

MAMMALIA.

The parts of Mammalia, (or those animals which suckle their young,) which are at once the most interesting to the naturalist, and the most easily preserved by the unscientific contributor to a museum, are the skin, and the skeleton or bones. All parts, however, are very useful, though there is some difficulty, to a person not accustomed to dissection, in preparing them.

When an animal of but a small size has been procured, such as a mouse, bat, rat, or even a squirrel, hare, or porcupine, the best mode of sending it to a museum is by placing it in a glazed jar, a large, wide-mouthed bottle, or a small barrel, with a large bung, filled three parts full of spirit of wine, strong gin, very strong bazar arrack, or any other ardent spirit, though on account of their not coloring the specimen, these are the best. A small hole should be cut into the belly of the animal before it is put into the vessel, to allow of the spirit entering freely into the internal parts, to preserve them. When a sufficient number of specimens have been placed, a wooden tally should be affixed to it, with a number cut thus

[oXXV. | oXL. | referring to a book, in which all the peculiarities of age, sex, color of the eyes, form of the iris, if round or oval, height, length, size in general, locality, &c. should be carefully noted ; close the vessel carefully with moistened bladder over the cork, or bung, and cement it all over with a composition of bees' wax, rosin, ruddle, and turpentine ; or common bazar sealing-wax may be used in default of any thing better, melted with enough very finely powdered brick-dust, to make it set hard.

Bones. The skeletons or parts of skeletons of mammalia, birds, and reptiles require but little knowledge or trouble to prepare them. The animal, or such part of it, the bones of which it is intended to preserve, should be skinned, and as much of the flesh as can be readily cut off, should be removed. The bones are then to be placed in a convenient vessel, such as a barrel, for large specimens, and a jar, or even a bottle, for small ones ; and water enough poured into it, to cover them well up from the air. Close the vessel, and leave it for a longer or shorter time, as may be necessary, for the complete maceration of the bones ; till the remaining flesh and ligaments will strip off with such ease, that the pouring a stream of water from a height of four or five feet upon them, will be sufficient to remove them. When freed from flesh and ligaments, the bones should be put in the sunshine to dry ; and when well dried, they may be at once articulated, or packed in cotton or saw-dust, to prevent their rubbing against one another and being injured by carriage ; and in this case the sooner they are sent to their destination the better.

In macerating bones, it is necessary to take care that the water always covers them, otherwise they will become indelibly black. The flesh must never be scraped off, or the specimen may be injured.

In washing bones after maceration, care must be taken that those parts which have become loose are not lost. This is likely to happen with the incisor, or front teeth ; and with those bones, which, in young animals especially, are united to the other parts by ligament and by cartilage or gristle. All such detached parts should be taken off, cleaned, and put by in a small box or bottle, and labelled with the name of the animal of which they formed a part.

As this method is attended with some trouble, and cannot be followed by persons not stationary, and as it separates the bones too much from one another to allow of their being sent to a distance without risk of losing some of them, it may be as well to mention another : which, indeed, has been printed and circulated in a separate form, along with a few more hints of the same kind. In this process, skin the animal, and cut off all the flesh from the bones as clean as can be done, *without scraping* them. Separate the fore legs, with the shoulder blades, from the body, and the hind legs, by taking the thigh bone out of the socket at the hip. Cut off the head close, between it and the first joint of the neck ; and allow it to remain in water for a few days, when the brain may be washed out by directing a stream of water from a *blisty's mussack*, or earthen pot, into the foramen magnum, or hole of the spine. When cleared of flesh, hang up the skeleton to dry in an airy place, but do not separate the bones from one another more than is mentioned above. And when dry, pack it up in cotton, tow, or saw-dust, in a strong box, for transmission.

SKINS of Mammalia may be preserved by attending to the following directions. After the death of the animal, let it remain an hour or two in a cool airy place, to allow the blood to congeal. Then lay it upon its back, and make an incision in the skin from between the fore legs, along the abdomen, to half way between the navel and the vent. The hind legs are then pulled out gently, bending them at the knee or stifle joint, and cutting them out of the socket at the hip. Cut off the tail close to the rump, and draw out the body through the opening in the skin, as far as

the shoulders, which separate at the shoulder-joint, and continue to draw out the body; an cut through the neck as close as possible to the head, between its first joint and the skull. Next pull out the legs as far as the fetlocks, either by the hand alone, or, as in large animals may be necessary, by fastening a cord to the bone, and attaching it to a hook in the wall, or a cross-beam, and then pulling down the skin. When skinned, cut off all the flesh from the leg bones, smear them well over with arsenical soap, wrap them in a little cotton or tow, and return them into the skin.

The head is next to be skinned very carefully, as far as the corners of the mouth, taking the greatest care not to cut the eyelids when the eyes are come to, and not to separate the lips from the gums; and the ears must be cut off as close to the head as possible. If the eyelids are cut, and the lips separated from the bones of the jaws, the specimen never looks well when set up; and if the ears are not cut off as close as possible to the head, they appear shorter than they ought to be. Having so far skinned the head, it must be left hanging to the skin; the flesh must be carefully cut off as clean as possible, the eyes taken out of their sockets, and the brain picked out with a hooked wire, or flat stick, and pair of forceps, through the foramen magnum, or hole for the spinal marrow at the back of the skull.

The next process is to smear the whole inside of the skin well over with arsenical soap; taking care to put some also upon the bones, and joints of the legs, and inside the skull, sockets of the eyes, mouth and nose. The balls of the feet and toes should have an incision made into each, and be well stuffed with arsenical soap; and a little should be put upon every part of the body which is naked of hair.

If the skin is very fat, as is the case with almost all the water animals, especially those of the dolphin, porpoise, halibore, otter, seal, and other cetaceous and amphibious genera; the fat must be all removed, and the skin rubbed over with powdered chalk or whiting, before the arsenical soap is applied. A little chopped cotton or tow should next be placed inside the head, and along between the skin and bones of the legs, face, &c.; and just enough in the body of the animal, to keep the sides of the skin from sticking together. The operation is now completed, excepting the skinning and stuffing of the tail.

The skinning of the tail is sometimes a more difficult business than all the rest put together. The stump of the tail must be fastened to a strong string, or in large animals, a cord, and the string tied to a beam, or hook in the wall, so as to bring the tail about on a level with a man's elbows, so that he may have full power over it. Two sticks, with a square edge on each, but the edges not so sharp as to cut the skin, must be applied, one on each side of the tail, and tied so as to inclose the stump between them. They are then to be taken hold of on each side, and forced down the tail, separating the skin from the flesh and bones, as they descend. This process prevents the skin from being turned inside out; which it is well to avoid, for it is very difficult, and sometimes impossible to get it right again. The skin of the tail is to be well smeared inside with arsenical soap, and a very small quantity of tow, or a small rope may be introduced by means of a split rattan, to keep its sides apart.

When the skin is thus prepared, it must be put in a cool airy place to dry, and after a day or two, it may be set in the sunshine. In damp or wet weather, however, it is better to put it in the sun immediately after being prepared with arsenical soap, otherwise the epidermis or scarf skin is liable to come off, and bring the hair along with it.

Care must be taken that skins thus prepared are well dried; and they should be sent off to be set up, as soon after they are dry, as possible. If

kept for any length of time, they ought to be frequently sunned, and always kept in an airy place, instead of being, as is too often done, shut up in boxes. It is the notion that zoological specimens must be excluded from the air, that has given rise to another notion not less absurd, that they cannot be kept in India. The experience of some collectors is to the contrary. And any person may analogically test it, by observing whether paper, clothes, &c. are mildewed most, when shut up, or not.

When an animal has been skinned and stuffed as above, there are still many parts of the body that are valuable to the comparative anatomist and to the zoologist. The bones of many animals are very valuable, and those of new and rare species should always be preserved for examination. The internal parts also of such species should be put into spirit and kept: the parts most useful are, the thoracic and abdominal viscera, particularly the heart and stomach; the organs of generation, external and internal; and the trachea, tongue and larynx.

The importance of affixing tallies to every specimen, and making notes and memoranda concerning it, cannot be too much impressed upon the mind of the collector. Every collection derives additional value from its having a good catalogue attached to it; while without such a catalogue, the best preserved specimens are often quite useless in a scientific point of view. As before said, the age, sex, size, height, length, circumference, locality, manners, colour of the eyes, form of the iris, and, in short, every thing peculiar about the animal, should be noted with the greatest care.

BIRDS.

In birds the skinning process is still more easy than in mammalia; though, as feathers are not so readily cleaned as hair, greater care must be taken not to soil them.

Birds are best procured for the purposes of natural history, by the gun. Those caught either in nets or by bird-lime, or any other means, are generally more or less injured in their plumage. To prevent as far as possible the feathers being soiled by the blood, the shot, with which the gun is charged, should be as small as is compatible with the size of the bird to be brought down, and the quantity of powder should not exceed half the usual load; in short, just enough of both shot and powder should be employed to bring down the bird. If the bird is only wounded, it should be taken hold of firmly under the wings, when by squeezing the sides of the body together, it almost instantly dies. When dead, the feathers over the wound should be blown aside, and a pledget of fine cotton placed upon it, to absorb the blood as it oozes out. Another pledget should be placed on the vent, and a quantity, proportionate to the size of the bird, must be put into the mouth, to prevent the blood of the wounded internal parts from coming out of the throat. The bird is then to be carefully wrapped in a handkerchief, taken home, and hung in a cool place.

After being allowed to hang for three or four hours, to allow of the coagulation of the blood, the skinning process may begin. The bird is laid upon its back, with its head towards the left hand of the operator; the feathers are carefully laid aside, and an incision is made from the fore part of the chest above the merry-thought bone, along the breast and abdomen, to midway between the breast bone and the vent. The skin is carefully pushed aside with the handle of the scalpel, or the fingers and thumb of the operator, backwards over the shoulder-joint, or that joint where the wing joins the breast; an incision through that joint is then very carefully made, (taking the greatest care to avoid cutting the skin of the back,) so as to separate the wing from the body, and a similar process is gone through on the other side. After having proceeded thus far, it is necessary to introduce some cotton between the skin and the body of the bird, to prevent the feathers from being soiled; and in fat water birds, the parts should be well sprinkled with powdered chalk. The mouth is next to be opened, and a pair of scissors pushed back into it, so

far as to enable them to embrace each side of the neck, and cut the vertebræ or neck bones through as close as possible to the head. A hook is then introduced into the fore part of the incision on the breast, so as to catch hold of the neck; when the bone may be readily drawn out, without disturbing or injuring the feathers of the neck. A string is now to be fastened to the vertebræ of the neck, and the bird hung up to a hook in the wall, or any other convenient place, and the skin very carefully drawn off the back. It should be pushed rather than pulled, and with the fingers and thumb nails rather than with the knife. Indeed, the less the knife is used in skinning birds the better. Unless very great care is taken, the skin will here be torn; for on the back it is very tender, particularly so, indeed, in some of the hawks and pigeons. When the hip joints are come to, the thighs and legs must be pushed up, so as to allow of their being cut off at the joint next to the hip-joint, leaving what is generally thought to be the thigh, but which is, in reality, the leg, attached to the skin. The skinning then proceeds down to the rump, and the skin is finally separated by cutting through with a strong pair of scissors the rump bone in the middle, leaving at least half of that bone attached to the skin.

In cleaning the head, the tongue and trachea, or wind pipe, attached to it, must be drawn out; and the gullet or œsophagus also, if that part has not been previously removed by the withdrawal of the neck. A pair of sharp-pointed scissors must be run through the top of the inside of the mouth into the brain, first on one side the head and then on the other, so as to cut a triangular flap in the base of the skull. This flap is then to be detached by seizing and twisting it out with a pair of forceps, long and slender, like those in the common dressing case of a surgeon. The brain is then easily removed through this opening, by means of forceps; a bit of wire bent into a hook, and cotton wrapped round the end of the forceps into a ball to wipe it out. When the brain is removed, the eyes are to be taken out: and this is done by introducing from the mouth a hook formed like the look found in the anatomist's dissecting case; by means of which, the eye is laid hold of and pulled inwards; taking care, at the same time, to detach it, by cutting the skin or folding of the outer coat of the eye, from its connections with the eyelid; and this must be managed carefully: for if the eyelid is torn, the head of the bird on that side never looks well when set up. The inside of the skull and eye-holes are to be well wiped out with dry cotton, and smeared with arsenical soap; after which, a pellet of cotton should be introduced into the eye-hole, and the eyelid closed accurately over it, so as to preserve the roundness of the part. A small quantity of cotton, dipped in arsenical soap, must also be put into the cavity of the head.

When the body has thus been removed from the skin, the wings are to be skinned as far as the first joint from the shoulder; and in a large bird, a little beyond. The flesh is to be removed from the bones of the wing, and the bones smeared over with arsenical paste, and covered with a small quantity of tow, dipped in the same substance. The legs are to be treated exactly in the same manner as the wings, skinning them as far as can be done without injuring the feathers.

When the bird is skinned, the skin must be smeared all over with arsenical soap, on the inside, especially about the rump and wings, where a good deal of flesh always remains. The inner side of the wings along that part of the bones not skinned, and the inner sides of the pinion, must have a small quantity of a solution of corrosive sublimate in spirits of wine, put upon them with a camel's hair pencil. For birds with a colourless plumage, it matters little of what strength this solution is made; but for those of the more delicate colours, two grains of the corrosive sublimate to one ounce of spirit will be enough; and this strength should not be exceeded, or the colours may be injured. A certain quantity of cotton is next to be put into the neck and body of the bird; the plumage

should be smoothed down ; a cone of paper, with the top cut off, to allow of the protrusion of the bill, is then made, and the bird put into it, and hung up to dry.

In the above process, there are some points in which the common rules of preserving the skins of birds are departed from in the following particulars : in the first place, the skinning process is different from that generally followed, in as much as the skin of the neck is never everted in this as it is in the common way, so that all the stretching of the skin and derangement of the feathers, which invariable accompany the other plan, are avoided ; and the inconvenience arising from which, in birds having large heads and slender necks, is very great : so much so, indeed, that in some birds, it is impossible to draw the head through the neck, and the making an incision, even, at the back of the head has been recommended. The rump is only half cut through, instead of being taken almost entirely out, whereby the feathers of the tail are faster and are carried better than they otherwise can be ; and if plenty of arsenical soap is used, no inconvenience follows from this. The wings are less deranged than in the common way ; and by commencing to take off the skin from the fore part of the bird, there is less danger of damage to the feathers from blood, oozing from the inside, than if the hinder part is skinned first. By the eye too being taken out from the inside of the mouth, the feathers at the side of the head, which generally are of delicate colours and structure, are not so frequently injured as by their being removed through the eyelids. Upon this point it may likewise be remarked, that the eye may be left in altogether, if the cornea is touched with the before-mentioned solution of corrosive sublimate in spirit of wine : and when the specimen is dry, the eye may then readily be cut out, and a ball of wet cotton put in its place ; and the eyelid becoming soft, may be arranged as before.

Before a bird is skinned, it is well to notice several points that may be useful to the naturalist, as well as to the person who eventually stuffs and sets up the skin.

The colour of the eye should be noted down, taking care to define the shade as accurately as possible. The weight of the bird, its length, from tip of the bill and crown of the head, to the end of the middle toe, to the rump, and tip of the tail, should be taken ; as well as the expansion of the wings. If there are any naked parts about the base of the bill, or the head, their colour must be particularly noted, as the colour of these parts is apt to change, as will indeed sometimes that of the bill and legs : these latter therefore should be mentioned too. In short, every thing that strikes the observer as peculiar about the bird, should carefully be noted down.

REPTILES.

In the preservation of reptiles, no great trouble is required. When taken, every thing likely to interest the naturalist, or any future observer, it is well to record ; while their dimensions and weight should always be mentioned. They may be divided into three kinds for the purpose of this essay. 1st, Chelonian reptiles, or those having a hard covering, as the tortoises ; 2nd, four-footed scaly-skinned reptiles, forming the Lacertan or lizard tribe ; 3rd, the Batrachians, or frogs and toads ; 4th, Serpents.

Chelonian reptiles are best preserved, by carefully removing the inside by an incision made in the soft parts, by the side of the fore or hind legs ; though in some, particularly in large specimens, it is necessary to separate entirely the upper shell from the lower, cutting through the hard parts at the sides, before the inside can be removed. The less disturbance, however, of the shell, the better, and the less the bones are deranged, the greater the use of the specimen. When the inside, or so much of it as can well be got out, is removed, the shell should be smeared on the inside with preservative, and the outside may be brushed over with the corrosive sublimate solution. The brain of reptiles is very small, and enclosed in a hard long case ; and it matters not much if it is removed or not, as

enough of the preservative penetrates to that organ to prevent injury to the surrounding parts, if the mouth is well filled, and an iron rod or skewer employed to pierce the various parts of the head from the mouth. Some reptiles of this order have long necks; in them the neck may be skinned through an incision made in the lower part, where the neck joins the chest; but when the shell is removed, there is no difficulty in skinning the neck through the opening that is necessarily made.

Chelonian reptiles may be stuffed with cotton, like mammalia, for the purpose of conveying them from one place to another.

The larger lizards, crocodiles, alligators, &c. must be skinned and stuffed, and treated in all respects as mammalia. The smaller may be put into spirit.

Frogs are very difficult to deal with: they are hard to skin and stuff; and when done, the colours for the most part fade. In spirit, the colours fade also, but not so much, perhaps as when preserved dry, while the form is kept better.

Toads are generally of a sombre colour, and keep pretty well either stuffed or in spirit.

It is not an agreeable thing to stuff a toad. It is done by putting a sharp-pointed pair of scissors into his mouth, cutting through the spine, and drawing it, and the whole of the inside, out through the mouth. The thighs and fore-legs are to be separated from the rest of the skeleton, and replaced in the skin; or if time is allowed, the skeleton itself may be denuded of all the soft parts, and replaced in the skin: and the skin is then to be filled by the mouth with sand. The feet should be fastened down with pins to a bit of card or soft wood, and the preparation put to dry: when dry, a hole should be made in the belly, to let out the sand, and it should be varnished with some good hard, colorless varnish: copal perhaps is the best*.

Very large snakes may be stuffed as mammalia are, taking care, however, not to fill the skin so full as is generally done. The size of the artificial body should be as near possible that of the natural one. Small snakes should be kept in spirit of wine.

FISHES.

Fishes, if small, may be put into spirit of wine—if large, they must be skinned, very carefully, and stuffed. It is an easy way of stuffing fish, to make an incision along the side of the dorsal or back fin, laying the fish open from end to end. The back bone, and all the inside, is then to be taken out as close to the skin as may be, without cutting it; the arsenical soap is applied well over the inside, the incision sewed up, and the skin filled with sand by the mouth. When full, the mouth should be opened or shut, according to the position it is wished for it to remain in—a wire, twisted into a tripod at each end, is placed to support the fish, and allow it to dry; and when nearly dry, it must be varnished, with the same varnish as that recommended for reptiles; by which means, the colours are pretty well preserved. When the fish is quite dry, the sand must be poured out at the mouth, and the specimen is ready to be sent to its destination.

CRUSTACEA.

Crustacea are found in various situations. Some are to be met with in the nets of the fisherman; some, as the sea crabs, may be caught by a line, baited with a muscle; others are found running about the sides of tanks, rivers, and shores of the sea; and others again, the parasitic crustacea, in various situations about the bodies of animals, especially on the gills of fish, or fixed on their bodies.

* Good copal varnish for this purpose is made by digesting powdered gum copal, without heat, for 48 hours, in spirit of turpentine: pouring off the clear turpentine, and allowing the varnish so made to evaporate in the sun to the proper consistence. By repeated digestions with turpentine, the whole of the copal may be dissolved, if pure; and the dissolution may be assisted by adding a little camphor to the turpentine, before pouring it upon the gum.

Crustaceous animals, such as crabs, lobsters, cray-fish, &c. may be all preserved in spirit of wine, but they generally lose their colours. Small ones may be dried as they are, but the larger specimens require to have the inside removed. Crabs are readily cleared, by taking off their shell, and drying it separated from the body, which has been previously freed from all the soft parts it contained. The corrosive sublimate solution is the best thing for the outside of crustacea, but arsenical paste should be smeared within. Great care is requisite to prevent crustacea being injured in drying, and they should be carefully packed in a good quantity of cotton, or the legs or antennæ will assuredly be broken.

Crustacea may be killed, if altogether breathers of water, merely by taking them out of that element. If partially or wholly livers upon the land, spirit of wine kills them readily enough. But care must be taken in handling some of them; for the crabs in particular make nothing of casting off a leg or two, with as much ease as a lizard does his tail.

INSECTS.

The class INSECTA contains a vast variety of animals. The mode of preserving them, however, is very much alike in all.

Insects are found in so many situations, that it is impossible to particularize more than a few. Upon and within vegetables living and dead; between the bark and the wood, and in the trunks and holes of trees; in the loose earth at their roots; under stones or logs of wood that have long been lying on the ground; at the roots of grass; between the leaves that grow close along the stem of some plants, as the plantain, sugar-cane, and many of the grasses; in bones and horns, both within their hollow cavities and in their substance itself. Dead carcasses of animals and putrid animal matter of all kinds contain some very beautiful specimens: and some of the finest kinds are found in water, both stagnant and running; in short, it is more easy to tell where insects may not be found than where they may.



Insects that feed upon trees and high shrubs, may be caught by placing a table cloth beneath, and beating the branches with a pole; when the insects are shaken down upon the cloth, and easily seen. A white chatah answers the same purpose almost equally well with a table cloth, and is more convenient to carry; besides being serviceable in another way. They are easily taken in a net made of curtain gauze formed like a cabbage net, and fastened to a hoop at the end of a long stick. By making the handle of your net with joints like a fishing-rod, you are enabled to reach the higher branches. In using this net, which is well adapted for butter-flies, dragon-flies, bees, wasps, and other insects that are caught on the wing, a peculiar turn is given to bring the tail part of the net over the handle, doubling it on the rim; by which means the prey is prevented from escaping. Another net may be made to fold up, having two poles or handles on each side, made of bamboo, or other easily bending wood: these handles are straight until near the top, when they are bent off at nearly a right angle, and fastened together with a string, or two pieces of wire, looped together to form a hinge: the lower part of the side poles are fastened together at a proper distance, say two and a half or three feet, with a small cord, leaving enough of the lower ends, to form handles, by which to use the net. The whole is then to be covered with gauze, from the upper end down to the cord below, when the net is complete. To use it, little skill is required; one handle is taken in each hand, and it is held up open, against any insect it is wished to catch, and shut up by bringing the handles together quickly, when the insect is secured between the fold of the gauze. Large pincers with loops or rings, and with gauze between their loops, are also used; but the common nets, described above, are the best; and, indeed, all that are necessary. Coleopterous insects, or beetles; Hymeropterous, or wasps, bees, &c.; Hemipterous, or bugs, &c., and, indeed, all others, save the Neuroptera, or dragon-flies, and the Lepidoptera, or butter-flies, moths, &c. when caught, are to be put into a bottle containing a little spirit of

wine. But those which have any particular marks of delicate colours, and those whose colours depend upon a powder strewn over them, must not be placed in spirit, but alive into boxes; and it is best to put but one insect into each box. Butter-flies must be taken between the thumb and finger, and pressed at the sides of the thorax, just under the wings, when they almost immediately die. Dragon-flies may be killed in the same manner.

When the insects are brought home, those kept in the spirit should be taken out, and if of sombre colours, placed in a solution of corrosive sublimate for an hour or two, when they may be put upon pins, and made ready for preserving them. Those insects that cannot be placed in spirit, on account of their delicate colours, &c., should be taken out of the boxes, and put into a glass, or a wide-mouthed bottle, and the glass or bottle with the mouth closed may have a bit of camphor or a drop of æther, or a bit of carbonate of ammonia put into it, placed in a basin of hot-water, when they soon die. Prussic acid has been used for the same purpose, and its effects are said to be instantaneous: but its employment may be dangerous to the operator, if great care be not taken.

When an insect is dead, it should be smeared over the under surface with arsenical soap, or LATREILLE'S preservative, the preparation of which has been given before; a pin, proportioned to its size, must be run, if a beetle, through the right elytrum or wing-case, and brought through the under side, between the second and third leg; and then it must be placed in a box or drawer. Other insects of all kinds should have the pin run through the thorax, or piece of the back, just in front of the elytra, and brought out between the legs below.

As a mere collector's cabinet, one convenient enough for the purpose may be made of any box; a French claret box, for instance, answers quite well enough, if provided with a close lid, to prevent ants and cockroaches from entering it, and fitted up with trays to run in grooves about $2\frac{1}{2}$ inches apart. The bottom of each tray must have a flat piece of solah well pressed; or a layer of cork, about $\frac{1}{3}$ of an inch thick, covered with paper, fastened on to it, will be better still, in which the pins, with the insects upon them, are to be stuck: or the top, bottom and sides of the box may be lined with solah or cork, so as to do without trays or drawers at all. Every fine day this box should be placed in the sun, to dry the specimens; taking care to keep the lid shut, that the light may not enter: for light destroys the more delicate colours of insects. With these precautions, insects may be kept for any length of time: for when once well prepared, the only thing requisite is to keep them dry.

Some very small insects cannot be run though with a pin. These should be placed upon a triangular piece of quill, cut into this form , the sharpest angle being introduced into the insect at its underside, between two of the rings of the abdomen. A pin is then run through the broad end, and the whole stuck in to the box thus . This is an improvement upon the plan hitherto recommended, of pasting the insect upon a triangular piece of card, inasmuch as it not only looks better, but it allows the under part of the insect to be seen, instead of hiding the characters of that part, which in some genera are very important.

Spiders are difficult to preserve, without their losing their plumpness and beautiful colours. Spirit of wine has been recommended, and when it is used, a good many may be put into a bottle together. If it is wished to preserve them dry, they may have the inside of the abdomen squeezed out, through a hole made in their under surface, and the cavity filled with very finely chopped cotton, or with sand; and then they may be pinned into the boxes. LATREILLE recommends that the abdomen be cut off from the thorax, stuck upon a stick, and introduced into a bottle, fastening the stick into the cork, so as not to touch the sides, and holding the bottle over a lamp or fire, till the specimen becomes dry, which is then stuck on the thorax again. Any of these plans will do with some of the

genera of spiders, tolerably, but none of them answer well. Caterpillars are in the same predicament as spiders, though a method of preserving them in all their beauty is said to have been discovered by Mr. ABBOTT, of Georgia, which seems to have been lost at his death.

MOLLUSCA.

Those animals which, as their name imports, have soft bodies, and which, for the most part, are covered with a true shell, are divided into two kinds: those which inhabit the land, and those which live in the water. The latter are again divided into fresh and salt-water Mollusca; and a third portion seems to dwell in marshes, the estuaries of rivers, &c., forming an union, as it were, between the other two. The fresh-water Mollusca are found in tanks, running streams, and watery places of all kinds, either lying at the bottom, or floating in the midst, or attached to weeds, stones, and other extraneous substances. Salt-water shells are found in similar situations in the sea; some bury themselves in the sand, which is covered at high-water by the tide; while others may be found floating along upon the surface of the waves; and dead specimens lie scattered upon the shore. Marsh shells are to be met with in the estuaries of rivers and in wet places, whenever the salt-water mingles with the fresh.

The localities of land shells or snails, as they are generally called, are numerous. These shells are to be found upon the trunks and branches of trees, and lying or creeping beneath them; others are hidden under stones and pieces of timber, or weeds, or other vegetable matter. The best season to procure them is in the rains; and they are not found in abundance saving in moist places.

Having learnt the localities of the various kinds of shells, no great skill is needed to procure them. Land-shells may of course be picked up with the hand, and taken home in a box: fresh-water shells, by looking for them in their dwelling places, and by dredging them up by a net. Sea-shells are dredged up by nets, having a kind of strong rake attached to the front, to rake them from the bottom; when by continuing to draw on the net, the shells fall into it and are caught. Pelagian shells, those that swim upon the waves in the middle of the sea, are procured by a kind of small net, that is towed in the wake of a ship, or cast by a dexterous hand upon the floating animal from the deck. It is in the form of a cabbage net, about a foot and a half in diameter, with a rim round the top, made heavy with shot; and fitted with a long line, to allow of its being towed, or pulled in again after it has been thrown.

When procured, put the shells into boiling water, and boil them for a few minutes, to kill the animal; so that it may be removed in the spiral shells with a small hook, or a crooked pin: the animal of the bivalves may be taken out easily enough with the fingers, or a pair of forceps. But some of the very long spiral shells require to be left in water till the animal becomes so putrid that it may be washed out. The shell should then be cleaned with soap and water, dried, and kept in a box. In cleaning shells, great care must be taken not to break or injure their margins or mouths; and in land-shells, particularly, not to scrub off, or otherwise remove the epidermis, or skin-like substance that covers them.

Each kind of shell should have a box to itself; and the box must be numbered, or the number may be written upon the shell itself, if it is large enough to allow of that being done. The numbers should refer to memoranda of the locality, kind of animal, or any other interesting particular concerning the specimen, that may be known to the writer.

By carefully following these directions, a zoological collection may be made, that will, with tolerable care being taken of it, keep in any climate. The mounting, as it is called, or setting up the skins of birds and beasts, to look like the living animals, is another branch of the subject; and one that can be followed only by persons stationary, and with success, after long practice; but as it is the step, to which the foregoing instructions have been but preparatory, a few hints on that head will hereafter be given